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ABSTRACT

A computer based dietary interviewing program enhanced self awareness for overweight participants. In a three part interview designed for direct interaction between patient and computer, questions dealt with general dietary behavior and details of food intake. The computer assisted the patient in planning a weight reducing diet of approximately 1500 calories per day and generated a printed summary for use by patients and nutritionists. (STS)

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Dietary Interviewing by Computer

Warner V. Slack & Others

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An experimental approach to counseling

Dietary interviewing by computer[1]

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How does computer-based dietary interviewing influence nutritional counseling? The results of an experiment reveal influences on both nutritionists and their clients.

A computer-based dietary interviewing program has been developed for use by patients and their nutritionists (1). In a three-part interview designed for direct interaction between patient and computer, the program asks questions dealing with general dietary behavior, elicits from the participant details of food intake on an average day, and plans with the patient a weight-reducing diet of approximately 1,500 kcal. During the interview, the program offers dietary suggestions and, on completion, generates a printed summary for use by patients and nutritionists. This print-out includes estimates of the caloric content of food portions for the average day and details of the proposed diet. The experiment described here was conducted to test two hypotheses: that preliminary interviewing by computer can assist nutritionists in subsequent dialogue with their patients, and that automated dietary counseling can assist patients directly in organizing their thoughts about eating and in planning their own dietary behavior. We also hoped to corroborate our tenet that dialogue with a computer can be a pleasant and personalizing experience.

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Methods

The techniques of patient-computer interaction have been described (2-7). For the dietary interview, a PDP-15 computer in Cambridge, Massachusetts communicated with a cathode-ray screen terminal in Boston at the Computer-Medicine Laboratory at the Beth Israel Hospital[6]. Questions, explanations, suggestions, and requests were displayed in English on the screen, and patients responded on a typewriter-like keyboard. A non-participating observer was available in case of unexpected problems. Responses were stored in the computer and used to select text and to collect summary statements to be printed after the interview.

Sixty-four volunteers, thirty-two men and thirty-two women between the ages of twenty and sixty years with the diagnosis of simple overweight, were randomly selected for participation, under the auspices of their physicians at the Harvard Community Health Plan[7]. None of the volunteers had received professional dietary help within two months prior to the experiment, and none had any medical conditions requiring nutritional therapy.

Two expert nutritionists who had not participated in the design of the experiment and, therefore, could perform in an independent, objective manner, were recruited from the Peter Bent Brigham Hospital to provide dietary counseling. All volunteers were interviewed by a nutritionist and by the computer—half by one nutritionist, half by the other; half saw the nutritionist first; the other half, the computer first. Men and women were randomly assigned to the groups in equal numbers. The interviews by computer and nutritionist were separated, on the average, by two weeks, although this time period varied considerably among the patients.

Volunteers were weighed before their sessions with a nutritionist. When the nutritionists' sessions preceded the computer encounters, the nutritionists interviewed and counseled the patients as they would under non-experimental circumstances. When these sessions followed the computer encounters, the nutritionists were given the computer-generated summaries to use in any way they wished. After each session, the nutritionists filled out a questionnaire assessing their dialogue with the patient and also the impact of the computer-interview and summary if the computer-interview had preceded the nutritionist interview. Patients completed questionnaires designed to obtain their reactions to the two interviewing situations and to elicit any questions that remained in their minds after the sessions. Three months later, each participant was asked to return for a follow-up visit, which

[6]Communication was by voice-grade telephone line at a transmission rate of 300 baud.

[7]"Harvard Community Health Plan: An Assessment at the Five Year Mark," available from Joseph L. Dorsey, M.D., Harvard Community Health Plan, 690 Beacon Street, Boston 02115.

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Table 1: Nutritionists' judgments of the amount of help provided by the interaction between patients and the computer

type of help for nutritionists	*interactions between patient and computer that were:*			*more helpful for*
	very helpful	*moderately helpful*	*not very helpful*	
obtaining a record of personal history and habits	12	17	3	Nutritionist A, $p<.002$*
obtaining a record of food habits and preferences	7	18	7	{Nutritionist A, $p<.02$ {women patients, $p<.02$
obtaining intake and caloric estimates for a usual day	6	18	8	Nutritionist A, $p<.02$
providing a basic meal plan	5	12	15	women patients, $p<.03$

*Probabilities based on three-way analysis of variance.

included a repeat of the computer session pertaining to food intake on an average day, an interview with the nutritionist, and a weight check.

A three-way analysis of variance was performed on the responses to the questionnaires. Interviewing sequence (computer first vs. nutritionist first), nutritionist (A vs. B), and patient's sex were used as factors in the analysis. Relationships between judgments of the experimental session and one or more of the factors were thus examined.

Results from the nutritionists' viewpoint

Although the nutritionists differed in the amount of time spent with their patients, both spent less time with those who had already been interviewed by computer. Nutritionist B spent an average of 58 min. with the computer-first patients and 68 min. with the nutritionist-first patients ($p<0.05$, *t*-test, single-tailed). Nutritionist A averaged 39 min. with the computer-first patients and 45 min. with the nutritionist-first patients (not significant at the 0.05 level). The time spent with men was particularly influenced by the computer-first session. The average interview lasted 48 min. with men who had had computer sessions and 58 min. with those who had not ($p<0.02$, *t*-test, single-tailed).

The nutritionists frequently found the computer-generated summary helpful, particularly because it recorded information about personal history and habits (Table 1). The meal plan developed by patient and computer was less likely to be helpful: in eleven instances, the computer summary interfered with the nutritionist's interview, and nine of these instances were referrable to problems with the dietary plan, particularly its lack of flexibility. However, a number of comments indicate that other aspects of the computer interview were useful. A typical statement regarding the section on average daily intake was: "The patient realized how many calories he was actually consuming and seemed ready to try to diet."

When asked to compare the sixty-four volunteers with other patients in their experience, the nutritionists indicated by questionnaire that twenty-nine volunteers required less time and effort and only eight required more, and that rapport was comparatively high with forty-eight volunteers and low with none. Neither rapport with the volunteers nor effort required during the interviews, as assessed by comparison with others, was influenced by the interviewing sequence (computer first vs. nutritionist first).

Results from the participants' viewpoint

The participants' reactions to the experiment were generally favorable (Table 2). All but one thought they were helped: forty-five by both the computer and the nutritionist; fourteen by the nutritionist only;

Table 2: Patients' responses to questions about the interviews

question	*"Yes" responses to questions about the*	
	computer interviews	*nutritionist interviews*
helped in any way?	49	59
preferred for some things?	9	38
felt pressed for time with?	3	1
wanted more time with?	12	26
wanted less time with?	22	11
any questions asked only by?	20	20
would like to have again in three months	44	59
would be helpful for others?	54	61

Table 3: Categories of helpfulness revealed by the patients' comments about the computer and the nutritionists

categories of helpfulness	*comments by patients about the*	
	computer	*nutritionists*
provided information about nutrition	8	9
gave advice on diet and eating behavior	19	28
helped with exercise	3	0
strengthened motivation to lose weight	3	8
promoted personal insight	18	3
provided sympathetic understanding	0	3
responded to individual needs	4	7
explained and answered questions	1	11
was easy to understand	4	1
was enjoyable	2	2
total . . .	62	72

Table 4: Questions remaining with patients after interviews with the computer and the nutritionists

content of questions	*questions remaining*			
	nutritionist → *computer**		*computer* → *nutritionist*	
physical condition relating to weight problem	3	3	5	2
current eating habits	2	3	13	2
what should be eaten	2	3	12	2
diets and dieting	2	6	8	2
physical activity and exercise	4	5	10	4
shopping for the right foods	1	3	9	4
working diet into the family eating pattern	5	7	15	5
other	3	1	3	2
total . . .	22	31	75	23

*Sequence of interviews

and four by the computer only. Reasons given fell into ten categories (Table 3). The nutritionists were much appreciated for their advice about eating and for their ability to provide explanations and to answer questions. The computer served well in helping people gain insight into their own dietary behavior.

A number of questions about nutrition and dieting remained in the minds of participants after the interviews (Table 4)—more after the computer sessions, with the greatest number pertaining to the dietary needs of the family.

Each of the three parts of the computer-based interview lasted about 30 min.; used on a regular basis, 8 hr. each week-day, the computer-interview would cost about $6 per patient.

Fifty-six patients returned for their three-month visit. Thirty-six had lost an average of 7 lb.; thirteen had gained an average of 5 lb.; and seven had had no weight change. Weight change was unrelated to nutritionist (A vs. B) and to interviewing sequence (computer first vs. nutritionist first). On their return visit, patients continued to express favorable opinions regarding their participation in the experiment.

Discussion

Results of the experiment suggest that the computer-first interview was of help to nutritionists in subsequent dialogue with their patients. The sessions were shorter, particularly with men, and without apparent loss of rapport. It is unclear why time was saved by the computer-interview with men in particular. Perhaps the men were not used to giving detailed consideration to food and diet, and the questioning by the computer made them more efficient as respondents.

The dietary history was more helpful to the nutritionists than the dietary plan. Occasionally, the diet by computer seemed to mesh with a patient's needs ("the diet plan fitted her quite well, and it was basically a review visit for me"), but most comments by patients and nutritionists about the computer as a dietary counselor were critical of the limited number of options and thus far, the narrowness of scope in general—remediable problems, we believe, stemming from our inexperience with the computer as an advisor to patients.

The computer was better at asking questions than answering them. Participants could indicate when they didn't understand or were uncertain about their answers, but there was little opportunity for them to query the machine directly. The experiment has provided some insight into categories of dietary information that are likely to need explanation and clarification. Clearly, in subsequent revisions, the program must be made responsive to questions that arise during the interview.

It is not our intention to suggest that the weight loss in this experiment can be attributed to use of the computer. All participants had sessions with a nutritionist as well—our purpose being to study the process of patient-computer interaction and its effects, good or bad, on interviewing by nutritionists. However, we are confident that the computer can be helpful in studying the relative effectiveness of various types of dialogue with people who want to lose weight, and that the computer will prove to be a good medium for dialogue, should an effective approach be found. Techniques of behavioral analysis (8), for example, could be adapted to the interactive computer.

Because computer interviews were conducted in addition to nutritionist interviews, this experiment required extra patient time—a factor that is at least sometimes ignored in the scheme of medical things. Still, most of our participants seemed to benefit from both types of interview and recommended computer as well as nutritionist sessions for the benefit of others. Futhermore, we anticipate that revised versions of our program will be capable of providing good counseling for people who have no access to professional help and for persons with diabetes and hyperlipoproteinemia, as well as overweight.

In our experience, concern over the computer as a depersonalizing influence in dialogue with patients (9), expressed mostly by professionals, has been unfounded. Computer interaction has been a pleasant experience for most patients (2,10), and the dietary

program described here seemed especially good at helping participants understand their own thoughts and actions. Among the comments were: "It heightened awareness of eating habits"; "It gave me an almost exact picture of what I eat and drink daily"; and "The computer is yourself; you don't feel responsible to anyone except yourself." Such comments suggest a personalizing effect, which may prove to be a particular advantage of the computer as an interviewer. Conversation with a computer is, after all, similar to conversation with oneself. Soliloquy can sometimes be helpful in promoting insight (11) and, at least in this experiment, the computer was successful in enhancing self-awareness.

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